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Studying Aggression in Ants May Limit Pest Damage

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Biological invasions threaten the integrity of the world's ecosystems. Of the many different invading organisms, social insects – such as ants, bees, and wasps – are among the most harmful.

Social insect invasions damage agricultural systems, disrupt natural communities, affect large geographic areas, and are expensive to control.

Despite the environmental problems caused by these invasions, the causes underlying the ecological success of most invasive social insects are poorly understood. Studying these causes is important

in designing effective control strategies.

With support from USDA's National Research Initiative (NRI) Competitive Grants Program, researchers at the University of California at San Diego are examining the ecological impact of the Argentine ant (*Linepithema humile*).

ARGENTINE ANT PEST

Native to South America, the Argentine ant is now found throughout the world, including California and parts of the southeastern U.S., where it is both an urban and an agricultural pest.

On many species of plants, Argentine ants feed on the sweet excretions of Homoptera (a group of common insect pests) and thus protect them from predators and parasites (see photo at left). With their natural enemies deterred by the presence of Argentine ants, homopteran populations often attain large sizes and can injure host plants – including important crops such as citrus.

Wherever it is introduced, the Argentine ant competitively displaces native ants. This is of great concern since native ants play key ecological roles as predators, scavengers, and herbivores and participate in an astonishing array of

ARGENTINE ANTS ARE AN AGRICULTURAL PEST PRIMARILY BECAUSE THEY TEND HOMOPTERAN INSECTS, SUCH AS THESE SCALES.



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The Argentine ant's ability to displace other ant species is part of what makes this species a pest.

symbiotic associations with plants and other insects.

The Argentine ant's ability to displace other ant species is part of what makes this species a pest. Field experiments have shown that Argentine ants discover and recruit nest mates to food sites more quickly than do native ants. Moreover, Argentine ants fight aggressively with native species, typically driving them off (see photo below).

Underlying the strong competitive ability of Argentine ants are their sheer numbers. After they invade an area, they commonly outnumber all native ant species combined. In urban and agricultural environments, the Argentine ant's populous colonies are the primary reason this species achieves pest status.

Although previous research documented the competitive superiority of the Argentine ant, it left open the question of why they are more abundant than native ants. Insight into this disparity came from studies of the Argentine ant in its native Argentina.

Like many ants, Argentine ants in their native home exhibit pronounced territori-

ality – when they encounter non-colony members, they kill them. In contrast, Argentine ants introduced elsewhere typically exhibit low levels of aggression toward other Argentine ants and maintain expansive supercolonies, often extending over many kilometers.

To test if this reduced territorial behavior allows introduced populations to achieve the high densities that are key to their competitive dominance, the researchers reared pairs of colonies that either did or did not exhibit aggression.

They found that, compared to non-aggressive pairs, aggressive pairs have higher mortality, lower foraging activity, and lower rates of colony growth. These results help to explain the impact of the Argentine ant and provide a rare experimental demonstration of the costs associated with territoriality.

Other research confirms that numerical dominance, resulting from the absence of territoriality, is needed for the Argentine ant to prevail against other species.

IMPACT

Identifying the factors responsible for the Argentine ant's ecological domination remains an important goal for at least two reasons. First, understanding the basis of this invasion may help reveal the causes of other social insect invasions. Second, the success of control efforts depends upon a sophisticated understanding of the biology of pest species. ❖



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ARGENTINE ANTS OFTEN
OUTNUMBER AND DISPLACE
NATIVE ANTS, SUCH AS THIS
RED HARVESTER ANT.

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